Luc Edes

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Education

University of Waterloo Sep 2021 – Apr 2026
Bachelor of Computer Science *Waterloo, ON*

Technical Skills

Languages: Python, C++, R
Libraries/Frameworks: PyTorch, TensorFlow, Hugging Face (Transformers, Datasets)

Experience

AI Research Intern Sep 2025 – Dec 2025
Waabi - Behaviours Research *Toronto, ON*
- Researching algorithms for autonomous driving, with a focus on scalable deployment and potential publications.

AI Research Engineer Jan 2025 – Apr 2025
LMNT - Text-to-Speech R&D *Palo Alto, CA*
- Developed custom training pipelines for Direct Preference Optimization (DPO) and Kahneman-Tversky Optimization (KTO) to fine-tune Transformer-based models for speech output alignment with human preferences.
- Engineered automated preference dataset generation using ASR outputs, reducing production ASR error by $\sim$2%.
- Implemented speculative decoding with lightweight approximation model to accelerate speech token generation.
- Designed KL-divergence–based knowledge distillation loop for Transformer-based speech models.
- Architected end-to-end hyperparameter-tuning framework, featuring grid search, random search, and Tree-structured Parzen Estimator–based Bayesian optimization.
- Implemented μTransfer by adapting Transformer architecture to Maximal Update Parametrization (μP), allowing zero-shot hyperparameter transfer from reduced-width models to production-scale configurations.

Autonomy Research Lead Jan 2023 – Dec 2024
WATonomous – Data-Driven Autonomy Research *Waterloo, ON*
- Developed and integrated MPC Oracle with Hybrid Policy Optimization algorithm to provide optimal control actions for demonstration-based deep reinforcement learning, using MuJoCo for experimental validation.
- Surveyed deep reinforcement learning algorithms for autonomous driving (DDPG, TD3, SAC, RNN, LSTM, GNN, attention-based, GPT-based, imitation learning, curriculum learning); under review IEEE T-ATS (arXiv).
- Designed and trained Neural Network and Gaussian Process models for motion prediction in CARLA simulation.
- Embedded TensorFlow machine learning models into CasADi symbolic representation and integrated them with Acados optimizer to develop a real-time Model Predictive Control (MPC) pipeline.

Undergraduate Research Assistant May 2025 – Aug 2025
University of Waterloo – CompLING Lab (Vector Institute for Artificial Intelligence) *Waterloo, ON*
- Developed LLM post-training pipeline (SFT + PFT with LoRA) to study trade-offs in data budgets and ratios.

Undergraduate Research Assistant Sep 2023 – Aug 2024
University of Waterloo – Control, Learning and Logic (CL2) group *Waterloo, ON*
- Developed Model Predictive Control (MPC) pipeline in Python with CARLA for odometry data collection.

Undergraduate Research Fellow Jan 2024 – Apr 2024
University of Waterloo – Mina Arashloo Networking Lab *Waterloo, ON*
- Designed inductive synthesis algorithm to identify problematic network traffic patterns, reducing Z3 calls by 90%.

Research Assistant May 2023 – Aug 2023
Hamburg University of Technology – Institute of Maritime Logistics *Hamburg, Germany*
- Modelled container terminal operations using synthetic data generator, showing Monte Carlo simulations outperformed static rule-based methods for yard capacity estimation. (Accepted to LDIC 2024, Springer)
- Awarded bonus scholarship by Hamburg University of Technology for research excellence.
- Engineered data report cache, boosting internal benchmark performance by 15% for repeated report generation.

Projects

Ray-tracer | GitHub Repository
- Developed recursive ray tracer in C++ to simulate realistic 3D scenes with shadows, reflections, Phong shading.